August 24, 1964

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LINEAR PHASOLVER MEASURING ENGINE

The [redacted] will be shut down for vacation from August 24 until after Labor Day, 8 September.

The pattern master which was received from [redacted] August 3 was visually acceptable and has been measured by [redacted], [redacted] is out with the flu and [redacted] was in the middle of reviewing the measurement data.

The patterns are not as good as they could be, but the question Pete is trying to resolve is whether they are good enough for submicron measuring. The first and second harmonic errors, if constant from pole to pole, will wash out electrically. Pete thinks that second harmonic errors are a result of bleeding during pattern exposure and development.

Pete's tentative opinion is that the patterns are good enough to achieve 1/4 micron measurement resolution and they probably should be sent on to [redacted] to prepare the working pattern. He and [redacted] however, will have to discuss this thoroughly after careful review of the measurement data.

A copy of [redacted] instructions to [redacted] is enclosed. It illustrates the pattern at double scale. This simple set of measurements generates so much data that it is a real chore to assimilate it and judge the pattern quality.

It is expected [redacted] will take a month to prepare the working driver and then [redacted] will require one to two months for setup and trial. It looks like the demonstration will not take place before November.

Since the [redacted] has been doing a good job, I thought their other divisions might have applicable talents and their general brochure is enclosed. The only other possibility that I can see would be computer programs from [redacted] It is extremely difficult, however, to use that type of service.

[redacted]

NGA Review Complete

Enclosures

STAT

To [redacted]

STAT [redacted]

8/20/ Thurs-

STAT [redacted]

8/18 Report on measurements of Linear Theodolite [illegible]
Pattern 1000-2405
200 slot exposure/cycl

X axis alignment 20 μ in. over full length

Quadrature Top ~~[illegible]~~ to [illegible]
.009 to .018 mm out of .250 mm

Bottom -.003 to +.013 mm out of 250 mm.

+20 to -40 μ 1st Harmonic error
+6 to -20 μ 2nd Harmonic error
2nd Harmonic probably due to exposure & Development ~~image~~ growth.

Electrically can balance 1st & 2nd Harmonic error.

Couplers are less than a [illegible] with one 1/4 pole pair.

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Patterns are not as good as they could be. Question is are they good enuf to get submicron measuring

Pete says will achieve 1/4 μ resolution.. will have a systematic error, can be corrected for.

Bars are 1 mm prob. have 4 cycle error/mm.

NISTRI Mod TA3/A & TA2/A Stereocomparators

MOD RIC/1 Stereocomparator

STAT

2 weeks vacation starting Fri. 8/21 thru labor day.

INSTRUCTIONS FOR THE MEASUREMENT OF LINEAR PHASOLVER PATTERN CONSISTING OF 1000-2405 and 1000-2408

Pattern 1000-2405

1) Tabulate 21 consecutive measurements of sine wave height (Y axis) Vs. equal increments of .050 mm in X. The starting point should be the average of min. & max. values of Y.

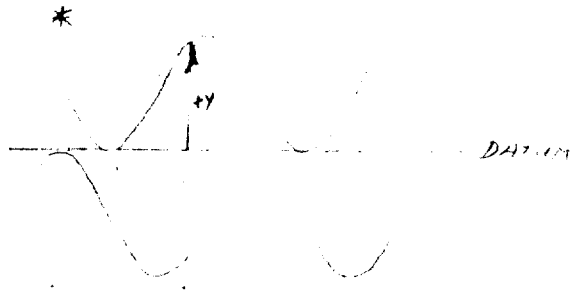
This procedure is to be repeated a total of 3 times within this pattern as noted A, B, and C on page 2. A and B denote two non-adjacent sine waves near the center of the pattern. C is the same sine wave as A but near the end of the pattern.

2) Measure the quadrature (phase displacement) at one place on the pattern as shown at D on page 2.

Pattern 1000-2408

3) Tabulate 21 measurements as in 1) above 3 places, E, F, and G on page 2. E and F are two non-adjacent sine waves near the center of the pattern. G is the same sine wave as E but near the end of the pattern. Measure from datum line in plus Y direction only.*

4) Measure the quadrature (phase displacement) in six places, three in each half of the pattern as shown in H, I, J and K, L, M.



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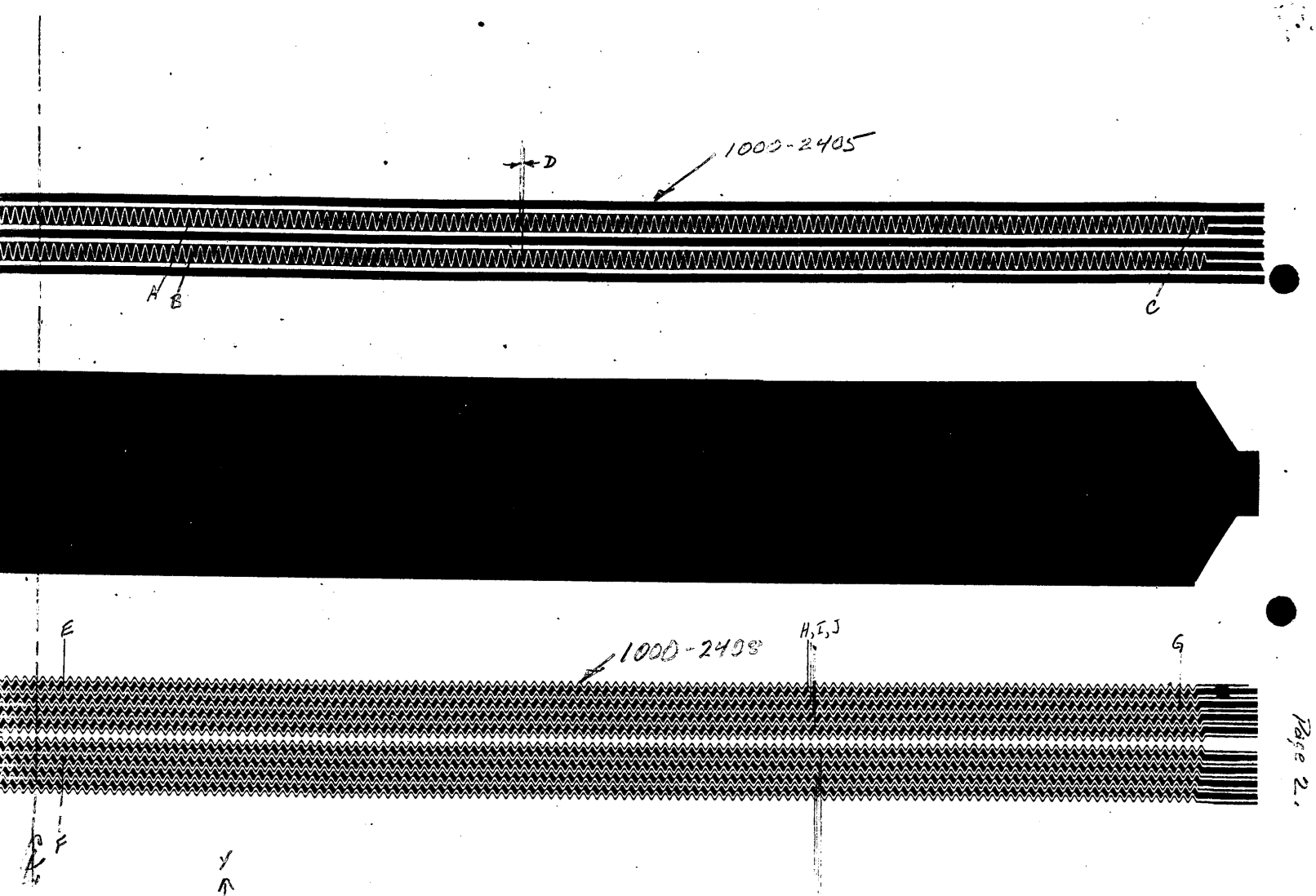

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